

REMARKS

In the Official Action of December 4, 2003, Claims 1-7 and 11 were rejected in view of the Kyrazis patent (U.S. Patent No. 4,589,070) and Claims 8-10, 12 and 13 were allowed in view of the prior art.

The Kyrazis patent discloses an airborne wind shear response system in which wind velocity is measured at two places: (1) close to the aircraft (e.g., about 10 meters ahead (see col. 5, lines 19-21)), and (2) at a considerable distance (e.g., about one kilometer ahead (see col. 5, lines 21-23)). A large difference in these two measured velocities indicates dangerous wind shear conditions.

The abstract of Kyrazis (like the specification of the cited reference) also refers to the taking of measurements of wind velocity both close to the aircraft and a considerable distance away. Likewise, the claims of the Kyrazis reference are directed to making a measurement in the near and far zones relative to the aircraft.

Unfortunately, atmospheric anomalies, such as wind shear, thunderstorms and wake turbulence, can take on an extremely complex structure. Studies have shown that it is necessary to try to understand this microstructure in order to determine if a wind shear event is present.

Unlike Kyrazis, in the present invention a series of at least two and preferably many spaced apart measurements are taken in the external atmosphere in an attempt to develop a profile of the remote atmosphere the aircraft is approaching. Merely taking one measurement of the external remote atmosphere only produces one relative measure of

wind velocity in the remote atmosphere. This is generally inadequate where a complex atmospheric anomaly is present.

By taking only one remote measurement, an aircraft using the Kyrakis method could fail completely to detect a dangerous wind shear condition. For example, the aircraft could sense the wind velocity in front of the microburst (at a distance of 1 kilometer ahead of the aircraft) and, at a later time, sense the wind velocity behind the microburst (again at a distance of 1 kilometer ahead of the aircraft).

An example of the type of situation that may result from the Kyrakis approach is illustrated in the attached Fig. B which is a modified version of Fig. 1 of the Kyrakis reference wherein the plane E takes two measurements C, D on each side of the microburst and misses registering the microburst completely. The measurement C is taken at the predetermined distance away from the plane and then, at a later time, the measurement D is taken at the same predetermined distance away from the plane but the measurement D is on the other side of the microburst because the plane has moved in the interim.

The need to accurately profile the structure of a microburst had led the US Federal Aviation Administration (FAA) to require 10 seconds of distant range monitoring in their FAA TSO 117a Standard, previously submitted in the Information Disclosure Statement of October 11, 2002, defining dangerous windshear events. A copy of a pertinent portion from that standard is also attached hereto.

In the present invention, the remote atmosphere is sampled in at least two remote locations and preferably at many remote locations. In the preferred embodiment, the

current relative wind speeds are processed and a profile is built up. In this way, information on the microstructure of the windshear event can be determined. Ideally, the number of measurement points should be large, however, in practice limitations on the machinery will be present. The measurements can be from as few as at least two predetermined different distances in front of the aircraft greater than 200 meters away from the aircraft.

Applicant has amended Claim 1 to expressly recite that a series of reflected optical responses from the remote atmosphere corresponding to reflections from at least two predetermined different distances in front of the aircraft are detected. The two predetermined different distances are each at least 200 meters away from the aircraft.

Support for the recitation of "greater than 200 meters away from the aircraft" is found, for example, in the specification at page 2, lines 26-28 wherein the predetermined distances are recited to preferably range from substantially 0.2 kilometers (i.e. 200 meters) in front of the aircraft to 4.0 kilometers. (See also claim 7.)

Claim 1 has also been amended to recite that the current relative wind speeds at the different distances (greater than 200 meters away from the aircraft) are processed to determine if a wind profile indicating a wind shear condition exists in the vicinity of the predetermined different distances.

In this way, amended Claim 1 now more clearly defines over the teachings of the Kyrakis patent. Claim 1 is not anticipated by the Kyrakis patent, and there is no teaching

in the Kyrazis or other references to modify the Kyrazis method to arrive at the invention of amended Claim 1. Accordingly, the rejection of Claim 1 should be withdrawn.

In the Official Action, Claim 2 was rejected as being obvious in view of the Kyrazis patent. Claim 2 recites the use of a global positioning system to determine the current position and the frequency shift of the reflected optical pulses to determine the current relative wind speeds at the predetermined different distances in front of the aircraft.

In the Kyrazis method since only a single remote point was being sensed (i.e. one kilometer ahead of the aircraft) there simply was no need for a global positioning system to determine the current position and the frequency shift of the reflected pulses. Accordingly, one skilled in the art would have no reason to combine a global positioning system with the Kyrazis system and there is no teaching or suggestion in the prior art to do so.

The use of a global positioning system facilitates locating the external wind shear events in the remote atmosphere. The global positioning system allows for more detailed 3-dimensional plots to be built up of wind shear microstructures and the ability to accurately locate the microstructures in an absolute manner is a very useful result especially at busy airports where other airplanes may be in the vicinity. In addition the use of a global positioning system effectively provides for the accurate calculation of aircraft ground speeds and related wind speeds.

In any event, since Claim 2 depends from Claim 1, Claim 2 is now in condition for allowance with Claim 1.

Similarly Claims 3-7 are allowable with amended Claim 1.

In the Official Action, Claim 11 was rejected as being anticipated by the Kyrakis patent. Applicant has amended Claim 11 to recite that the series of reflected optical responses are detected from at least two positions in the atmosphere corresponding to reflections from predetermined distances exceeding 200 meters from the aircraft.

The amendment to section (c) of Claim 11 is made for purposes of clarity only and provides direct correspondence with the series of reflected optical responses of section (b).


Finally, Applicant has submitted new Claim 14 which recites a method corresponding to the system of allowed Claim 8 and which is believed to be allowable for the same reasons as allowed Claim 8.

A prompt and favorable reconsideration of the present application along with an indication that Claims 1-14 are allowable and that the present application is in condition for allowance is earnestly solicited.

Respectfully submitted,

BURNS, DOANE, SWECKER & MATHIS, L.L.P.

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By: 
George A. Hovanec, Jr.
Registration No. 28,223

P.O. Box 1404
Alexandria, Virginia 22313-1404
(703) 836-6620

Fig. B.

